

Water Scarcity: Who's the Gorilla in the Room?

James W. Richardson

Regents Professor

AgriLife Senior Faculty Fellow

Co-Director of Agricultural & Food Policy Center

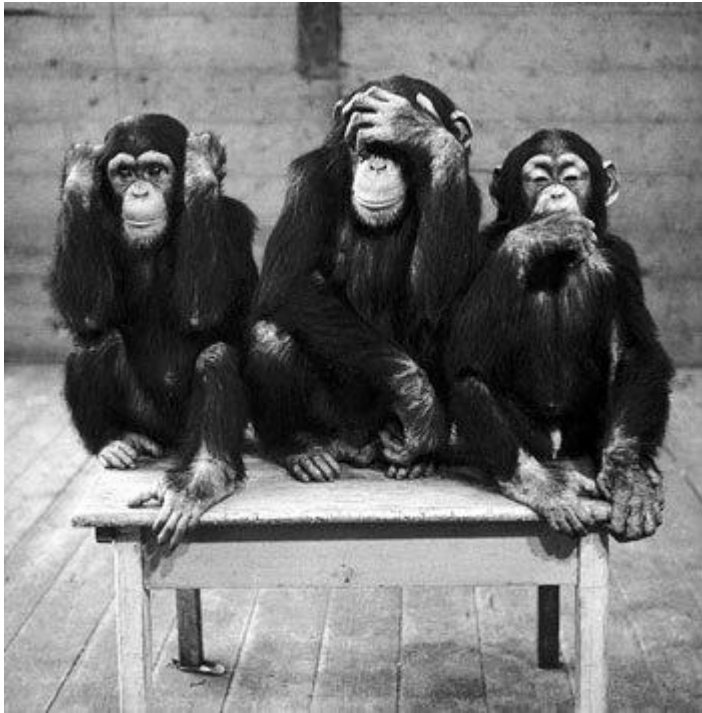
USDA Outlook

February 19, 2015

TEXAS A&M
UNIVERSITY

AFPC

A Gorilla or Three Big Monkeys?



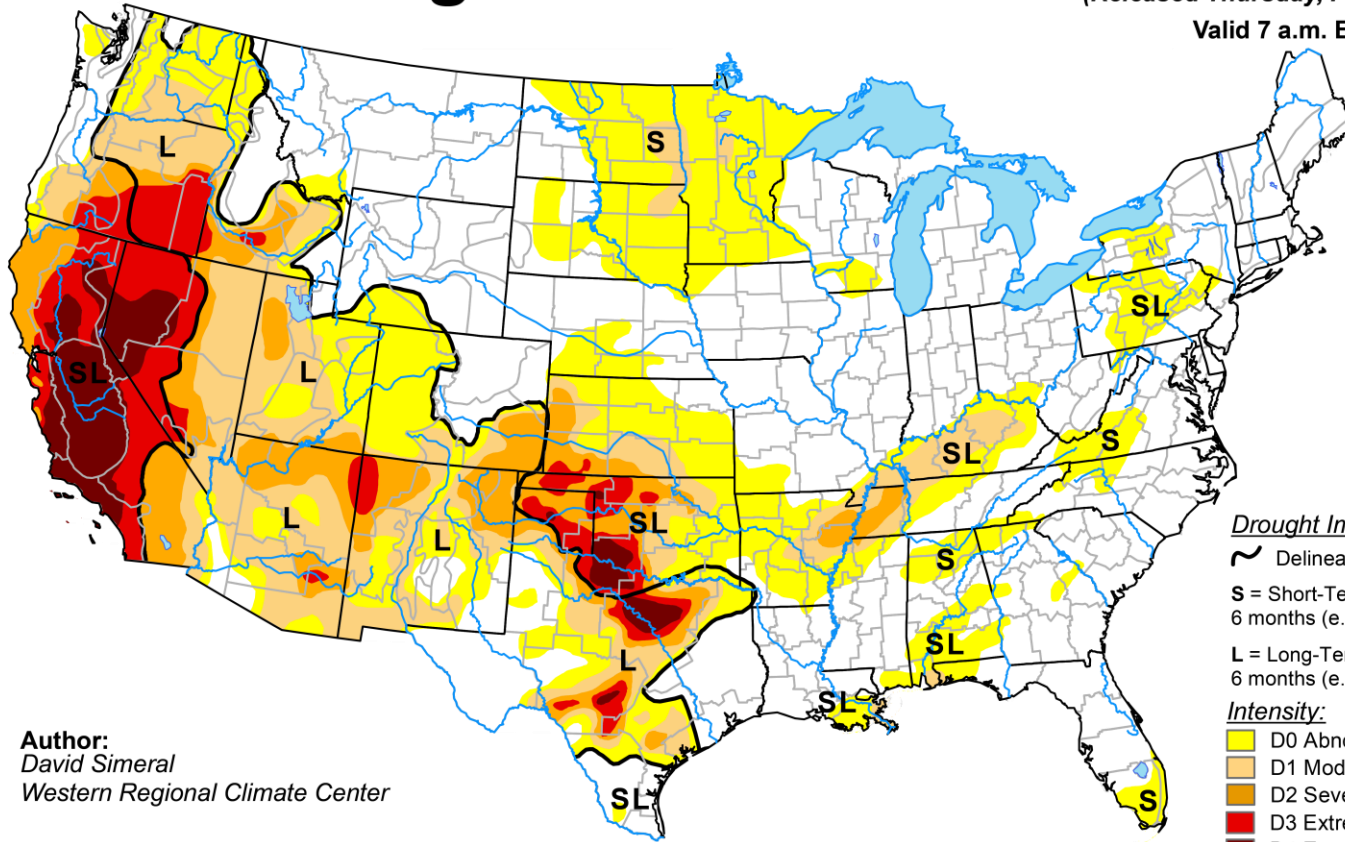
- Drought
- Population Growth
- Agricultural and Industrial Uses

US Drought: Current Conditions

U.S. Drought Monitor

February 10, 2015
(Released Thursday, Feb. 12, 2015)

Valid 7 a.m. EST



Author:
David Simeral
Western Regional Climate Center

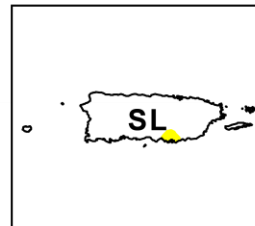
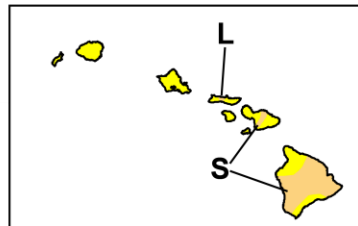
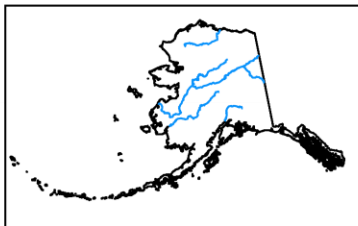
Drought Impact Types:

- ~ Delineates dominant impacts
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



<http://droughtmonitor.unl.edu/>

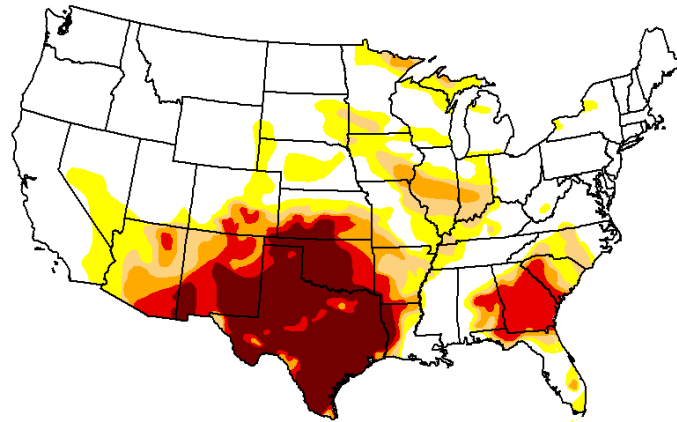
Texas is actually looking pretty good relative to 2011 ...

September 13, 2011

February 3, 2015

U.S. Drought Monitor
CONUS

September 13, 2011
(Released Thursday, Sep. 15, 2011)
Valid 7 a.m. EST



Author:
Mark Svoboda
National Drought Mitigation Center

USDA  
<http://droughtmonitor.unl.edu/>

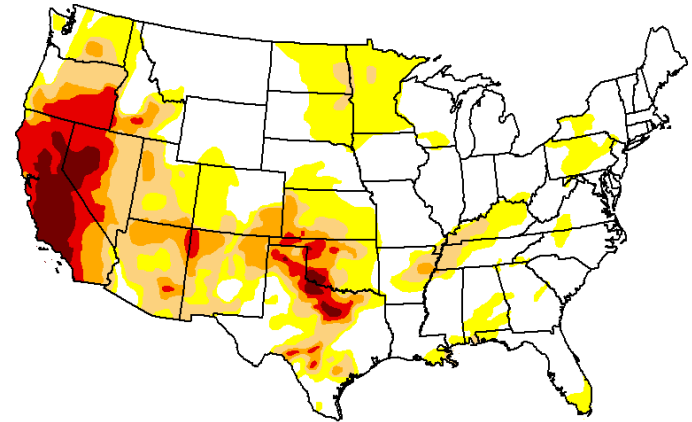
Intensity

D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

U.S. Drought Monitor
CONUS

February 3, 2015
(Released Thursday, Feb. 5, 2015)
Valid 7 a.m. EST



Author:
Brian Fuchs
National Drought Mitigation Center

USDA  
<http://droughtmonitor.unl.edu/>

Intensity

D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

... but parts of Texas are still in an exceptional, multi-year drought ...

Will Drought Be More Commonplace?

A ‘megadrought’ will grip U.S. in the coming decades, NASA researchers say

Fading El Niño could extend Texas drought

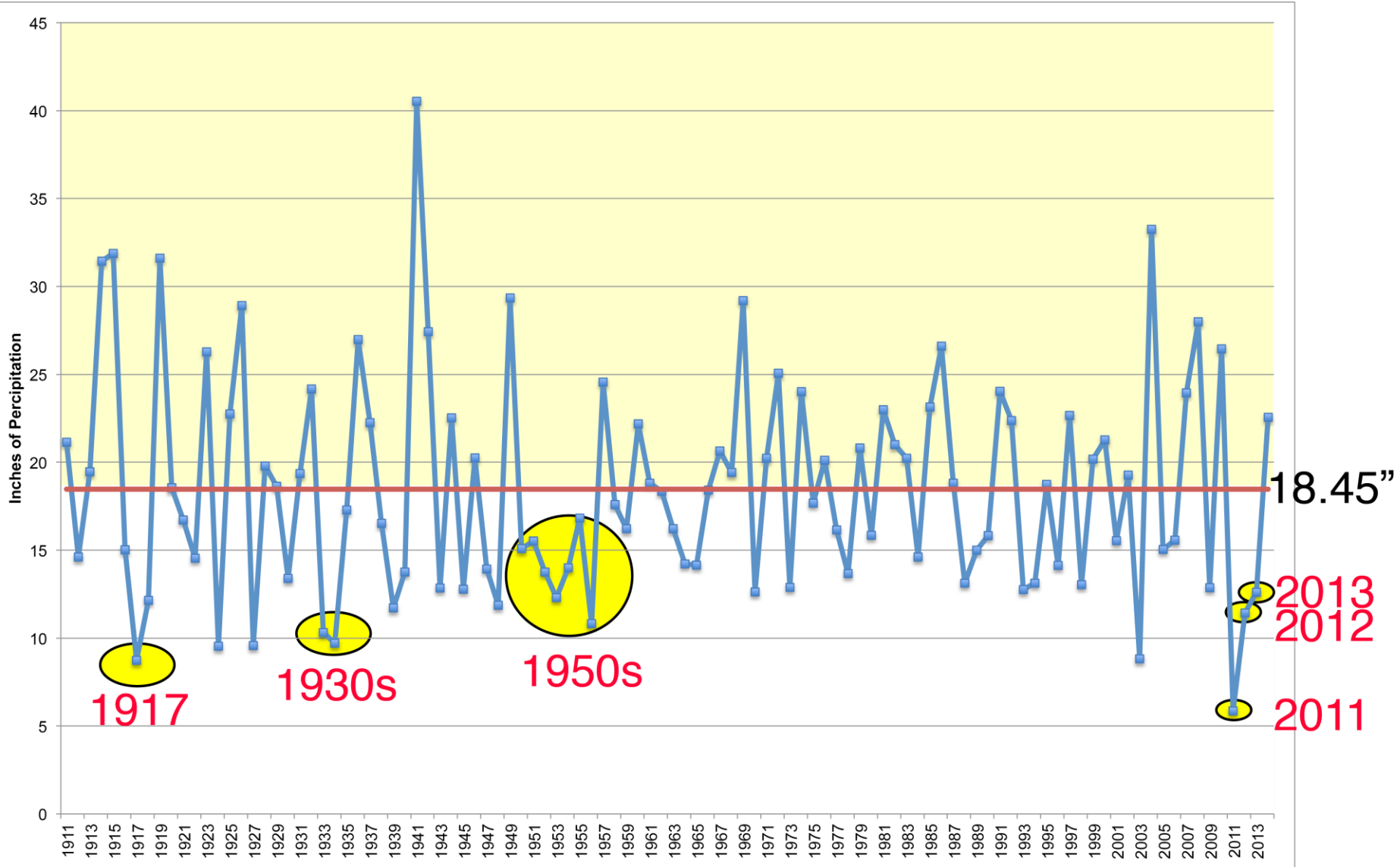
Southwest, Central Plains Face ‘Unprecedented’ Drought

Climate Forecast: More Southwest Droughts and Australian Floods

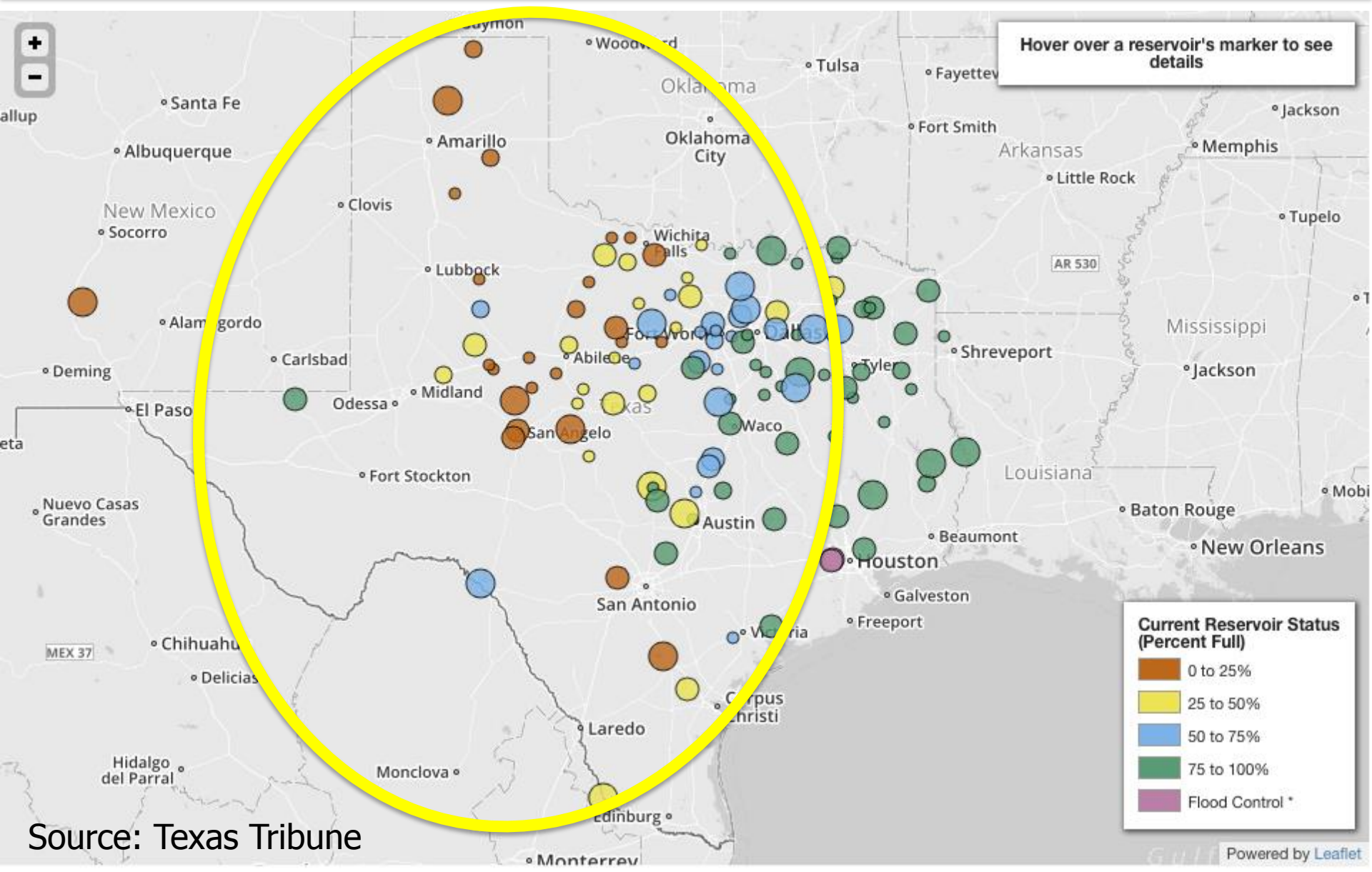
Global warming will drive La Niña to greater extremes, a new study says—and El Niño too.

**Drought among the worst in Texas
in past 500 years**

Lubbock, TX, Rainfall (1911 – 2014)

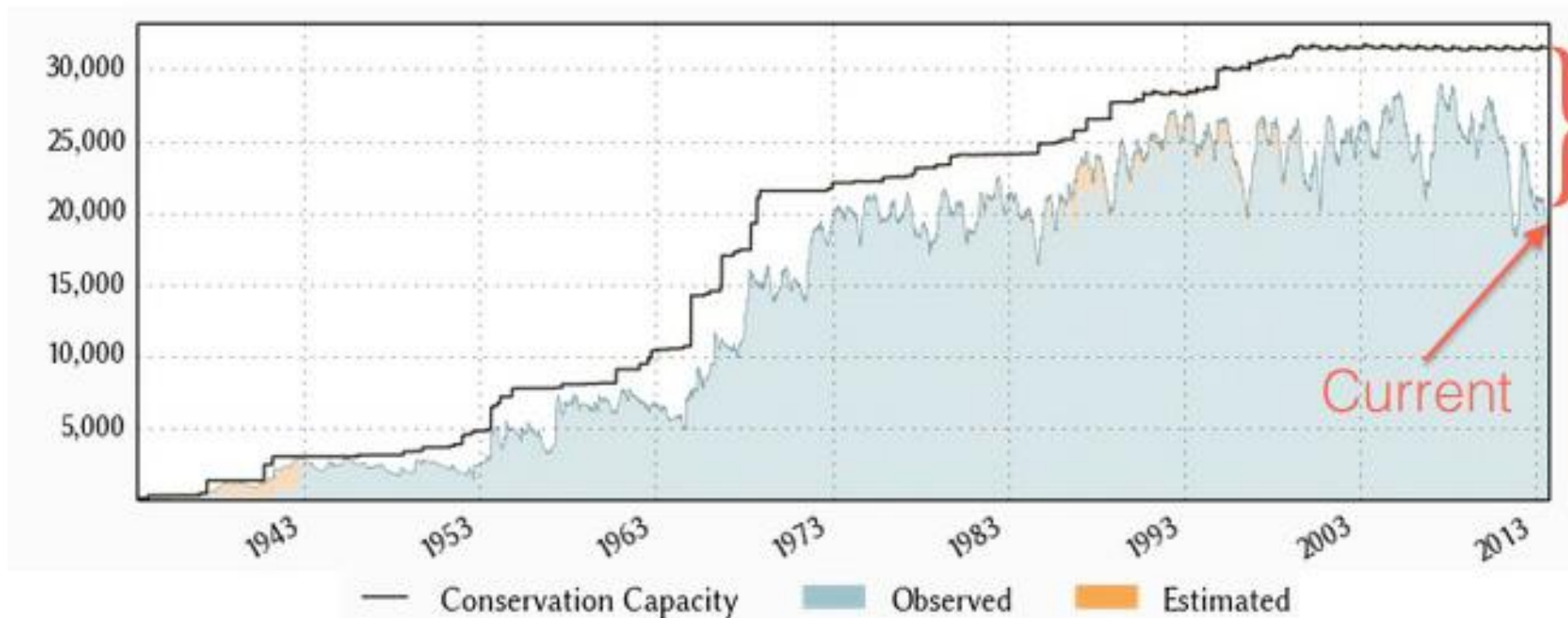


Texas Reservoir Levels (2015)



Reservoir Levels vs. Capacity

Texas water supply reservoirs are at 64.9%



2010 Census Results - United States

Percent Change in Population: 2000 to 2010

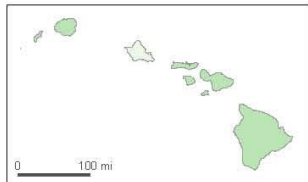
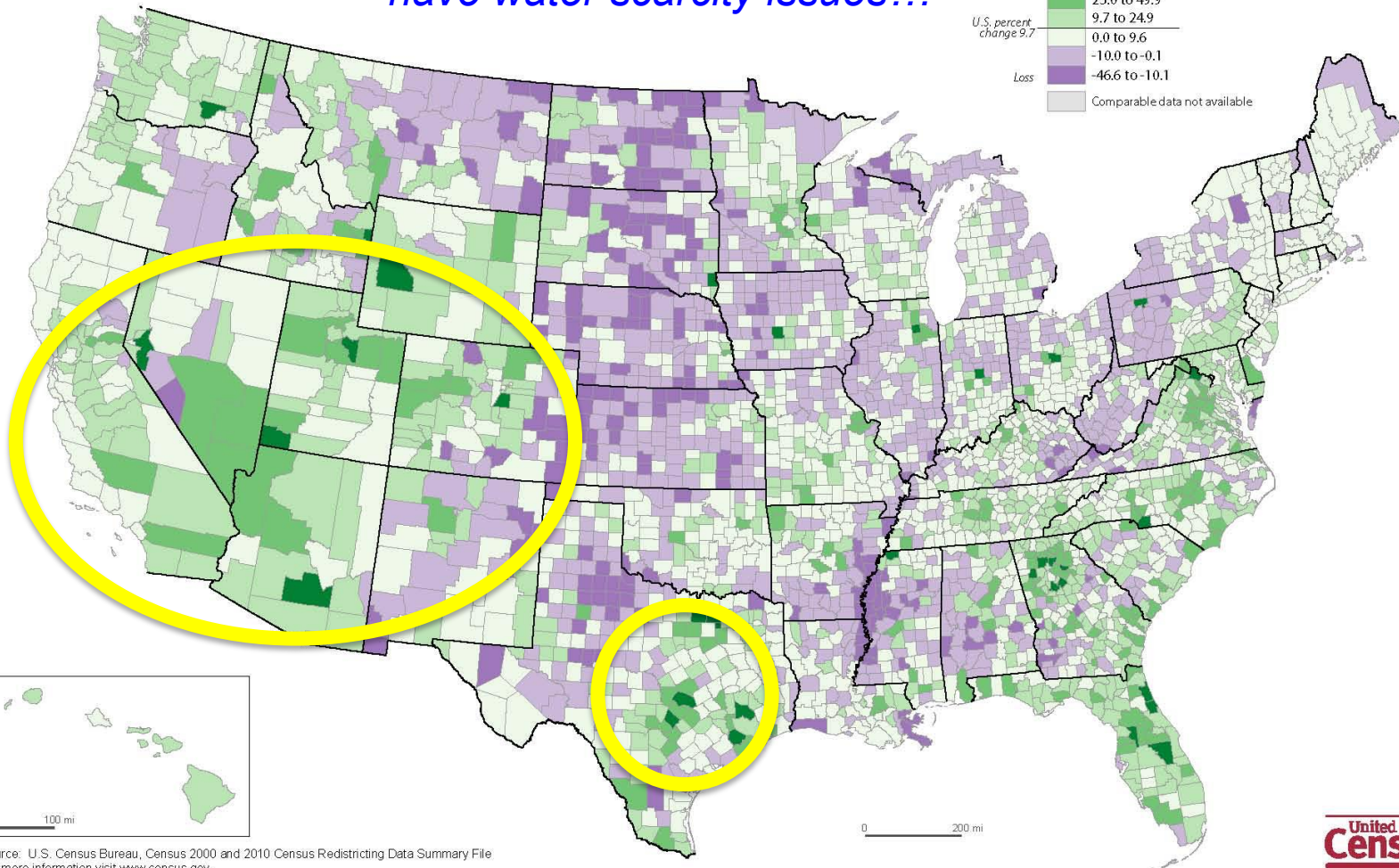
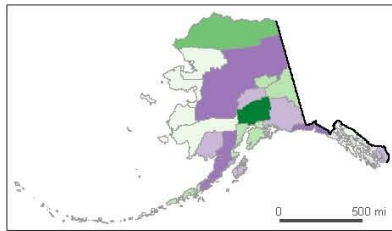
*US population growth areas
have water scarcity issues...*

Percent Change by County
or County Equivalent

Gain
50.0 to 110.4
25.0 to 49.9
9.7 to 24.9
0.0 to 9.6
-10.0 to -0.1
-46.6 to -10.1
Loss

U.S. percent
change 9.7

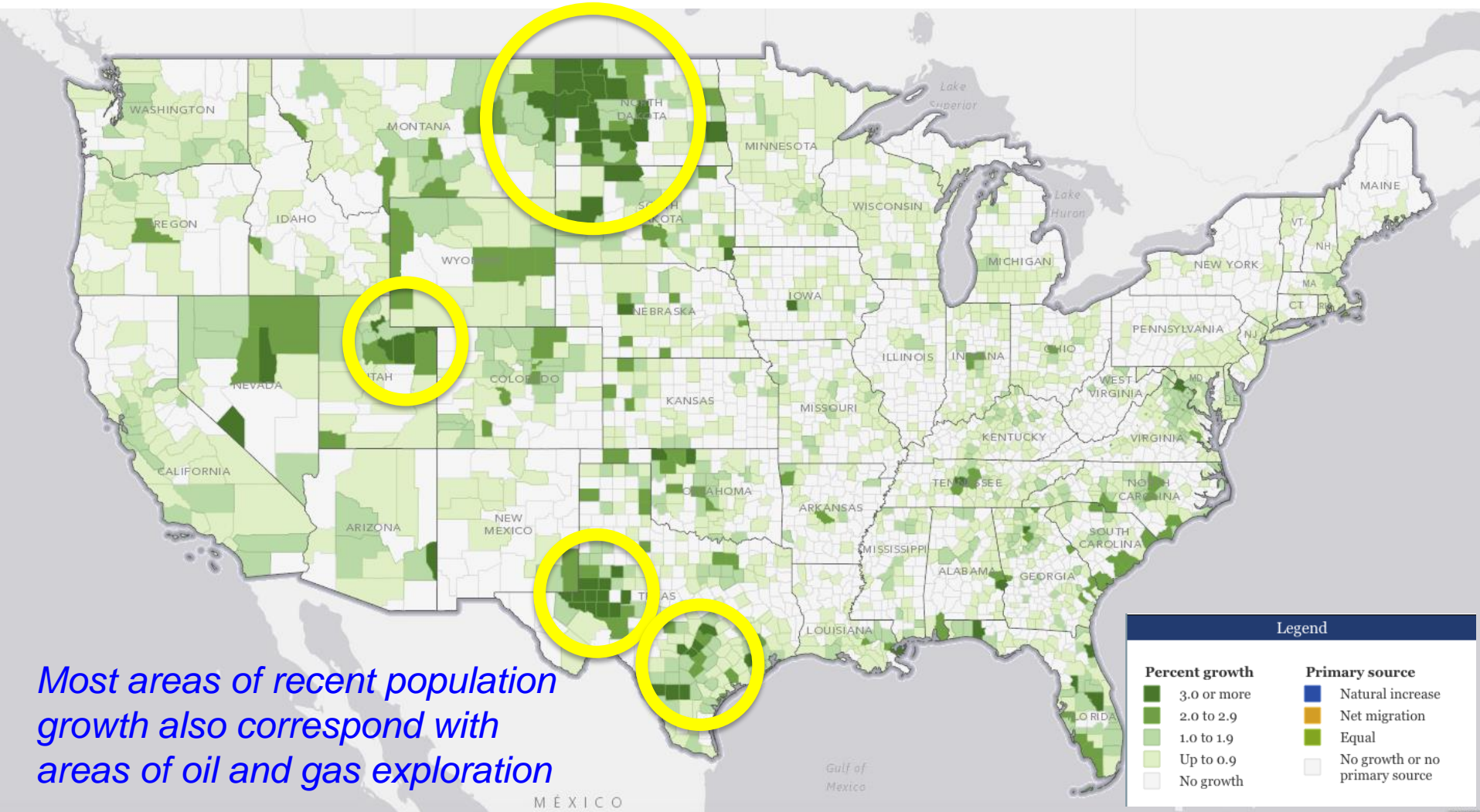
Comparable data not available



Source: U.S. Census Bureau, Census 2000 and 2010 Census Redistricting Data Summary File
For more information visit www.census.gov.

United States
Census
Bureau

County Population Growth (2012 – 2013)

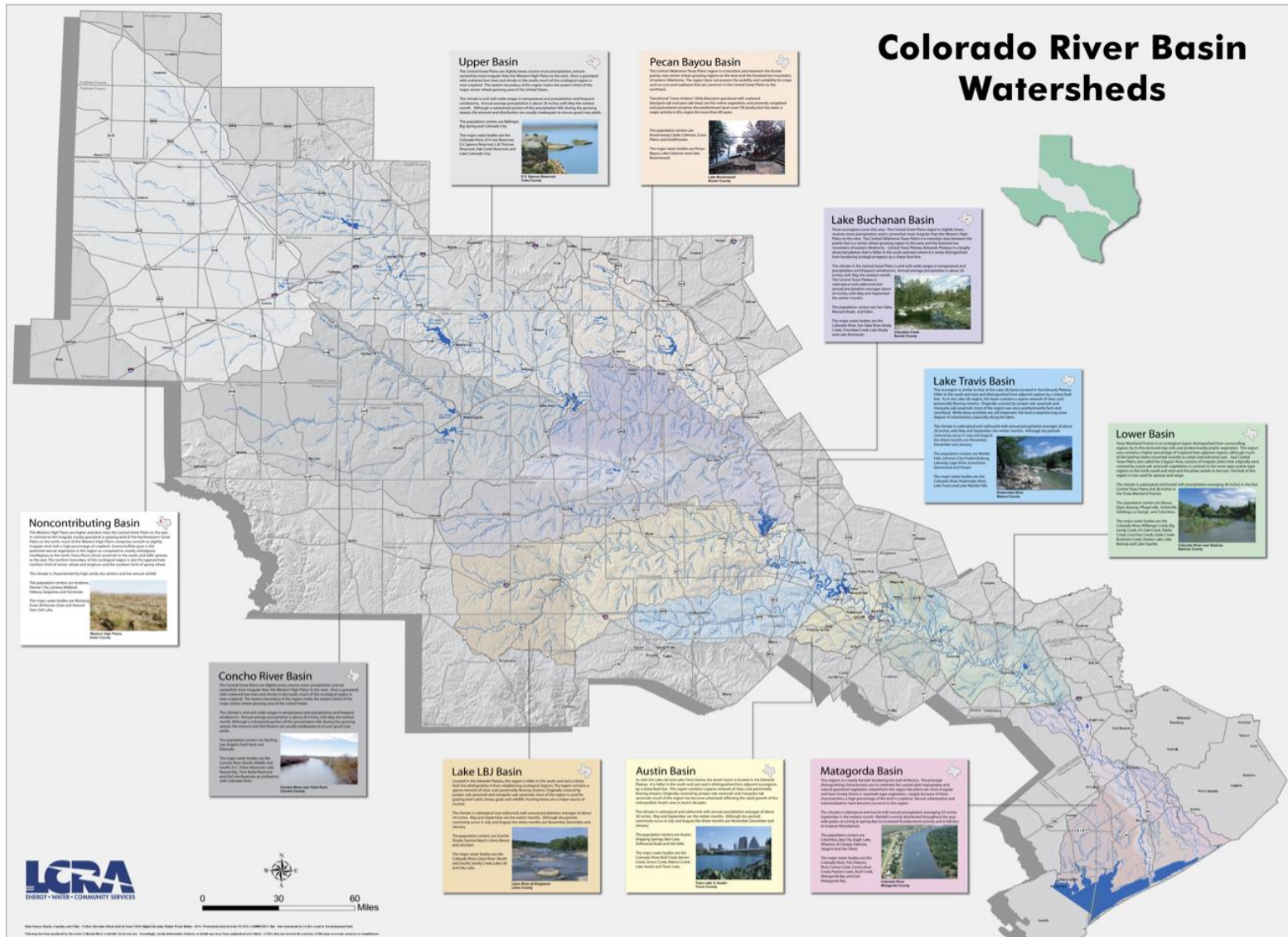


Source: US Census Bureau

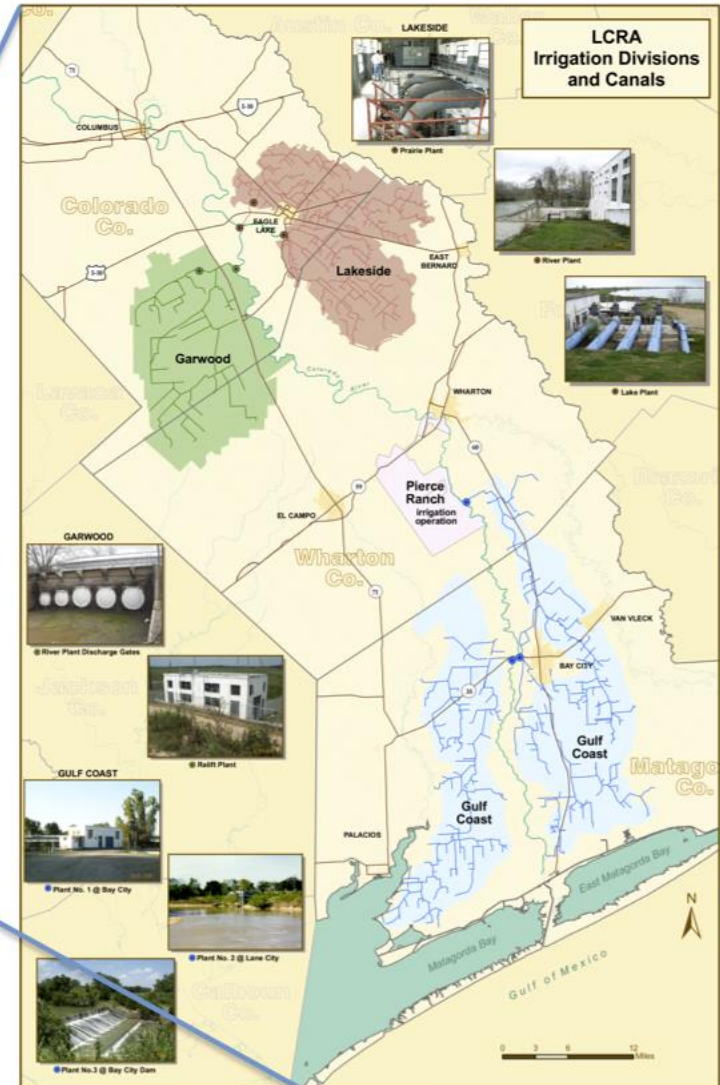
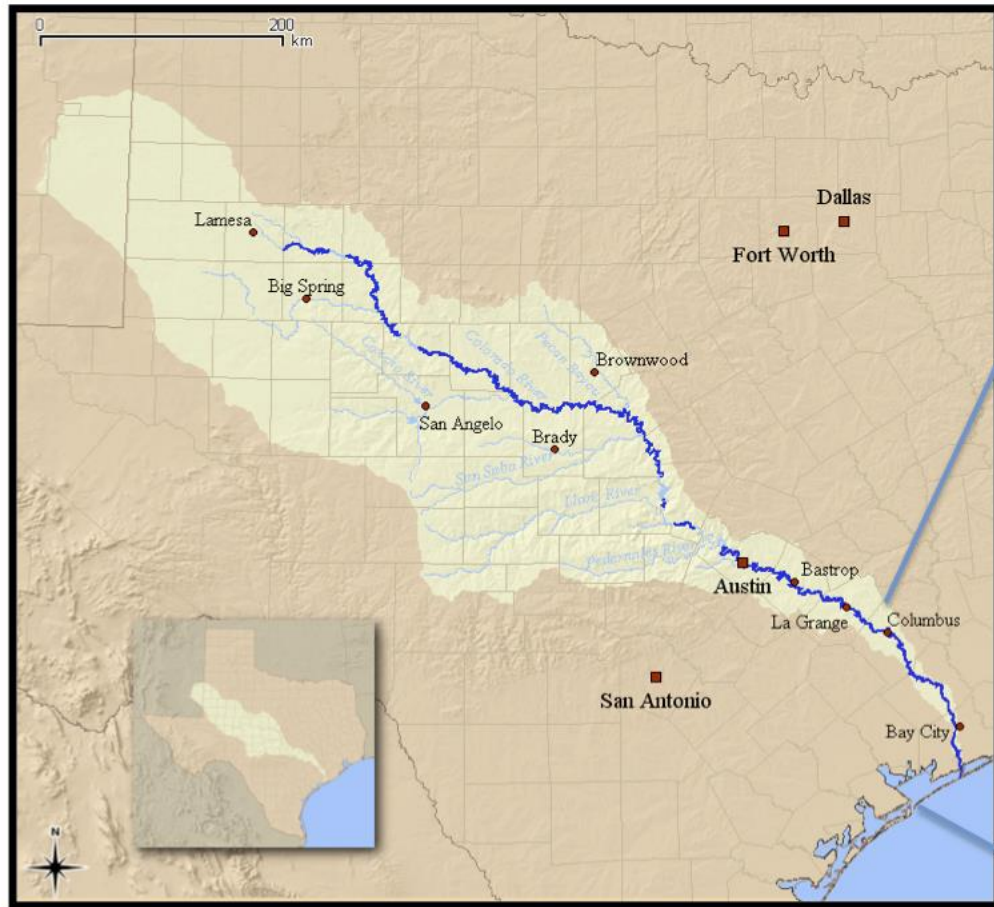
Situation

- Gorilla 1: A big drought in the Southwest
- Gorilla 2: Increased rate of population growth in the aid regions
- What does this mean for water consumers other than people?
 - Gorilla 3: Agriculture and Industry

Agriculture Example Will Focus on One River Basin in Texas

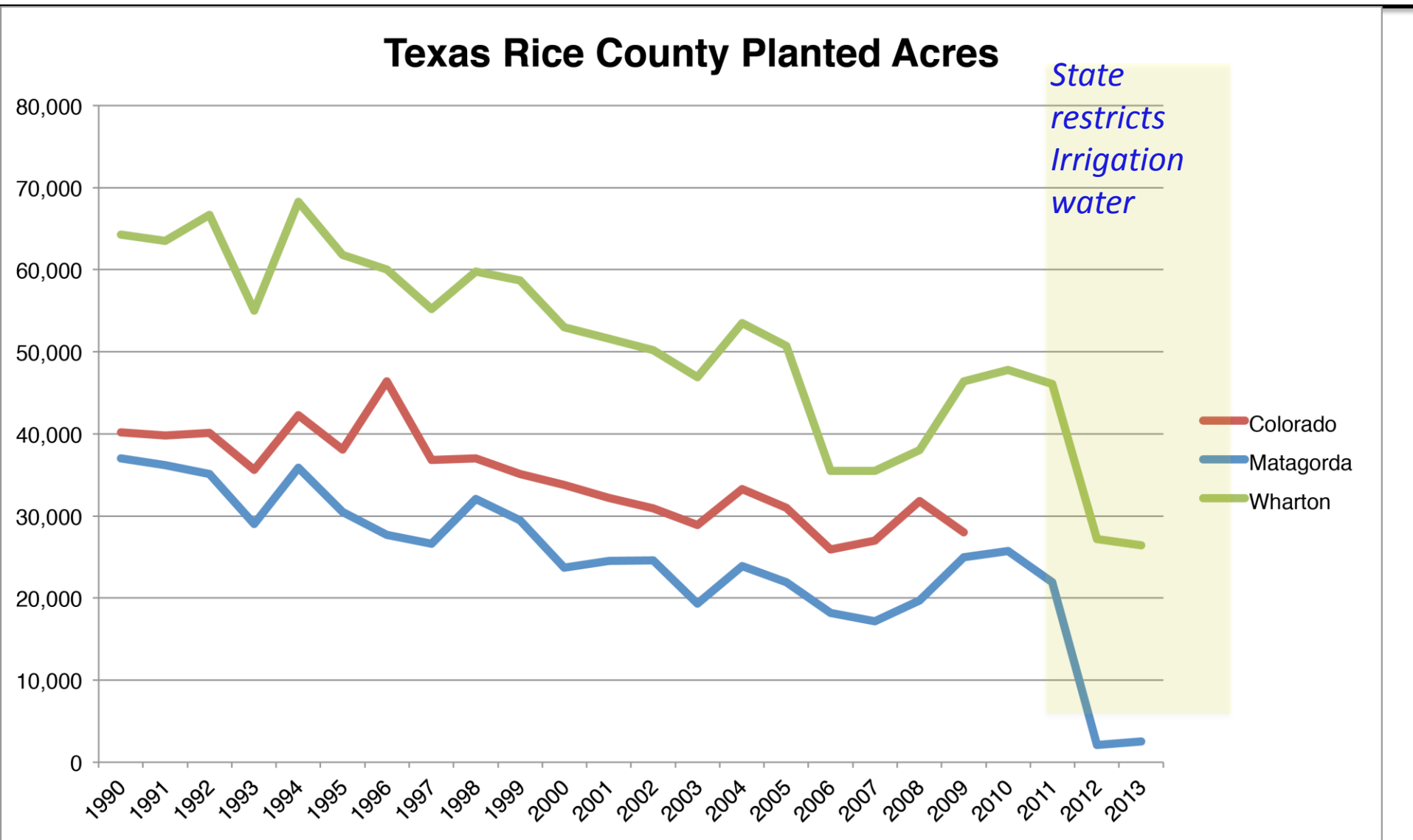


LCRA Rice Irrigation Areas in Texas



People vs. Agriculture?

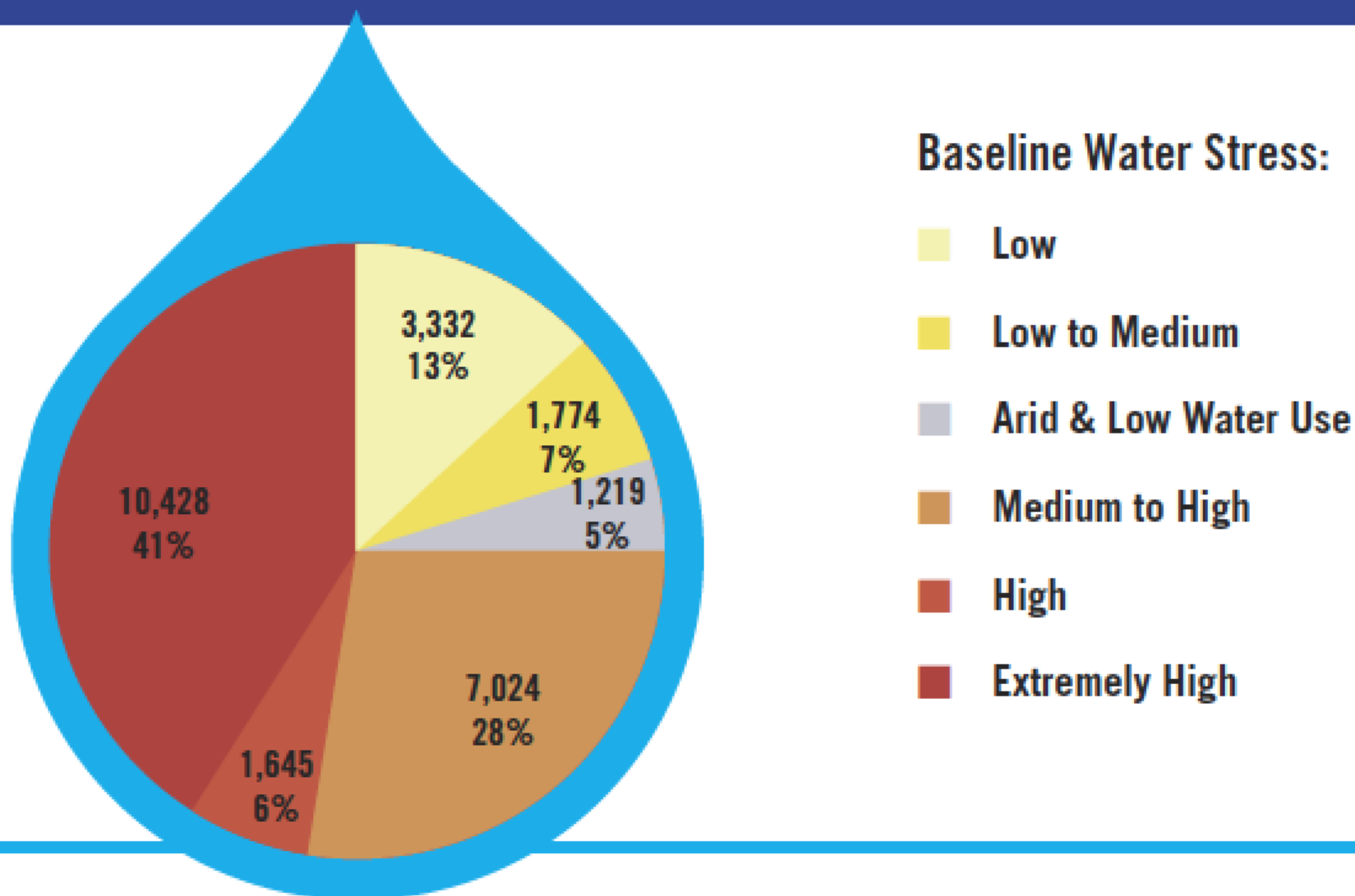
Texas Rice Farmers Take the Hit; No Water in 2011-15; Likely Cause a Loss of Infrastructure & Community



Energy Industry is a Growing Water User

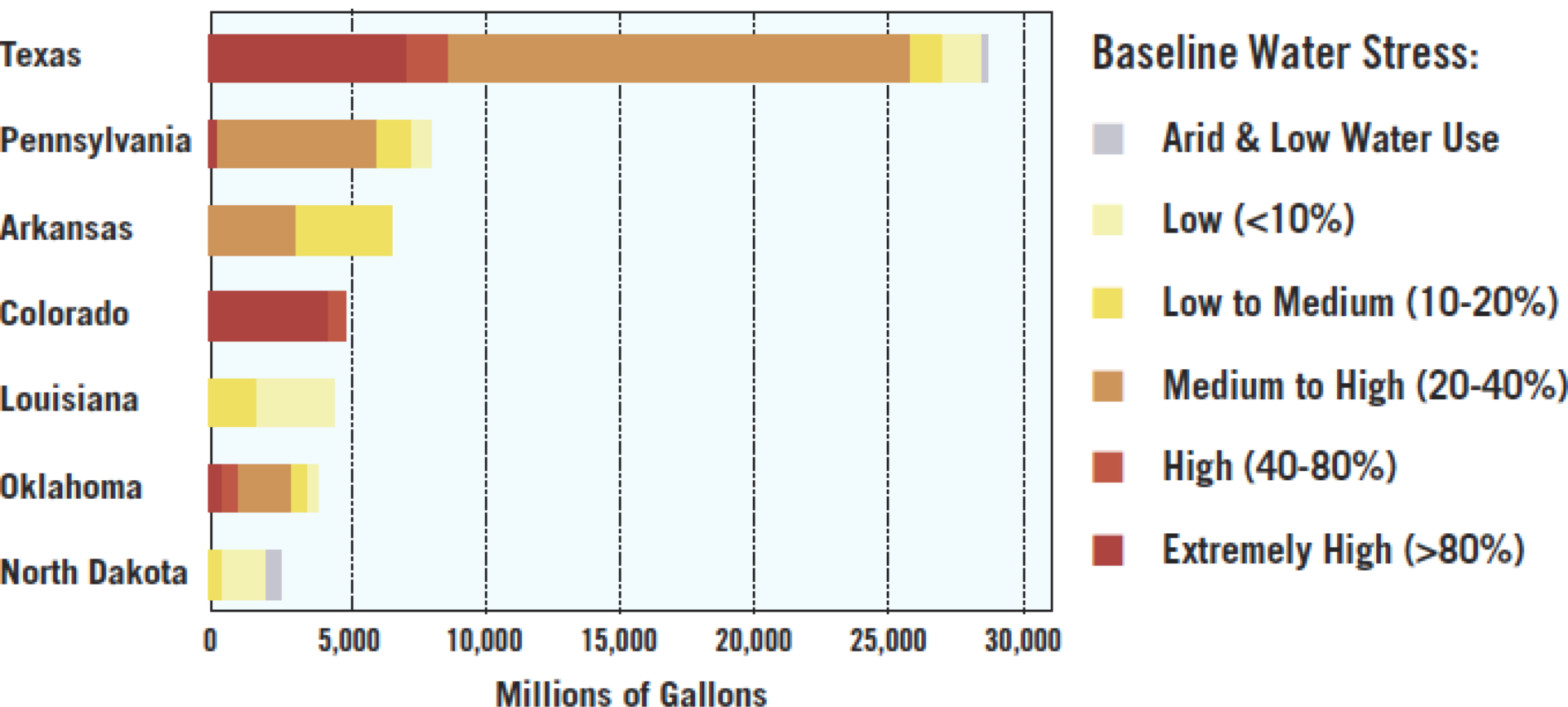
- Water used for fracking is small, usually about 1% of the state's water usage
- But, locally water usage could be quite large
 - 2 to 10 million gallons per well
 - Globally 38% of shale oil & gas in water stressed regions
 - In the Texas Eagle Ford Shale water use could amount to 89% of total water use in peak production
 - In the Texas Barnett Shale about 50% of water usage in 2006 was for fracking
- Jan 2001-Sept 2012, 25,450 wells reported using 65.8 billion gallons; the annual water needs for 2.5 million Americans

FIGURE 1: NUMBER & PERCENTAGE OF HYDRAULICALLY FRACTURED WELLS BY WATER STRESS



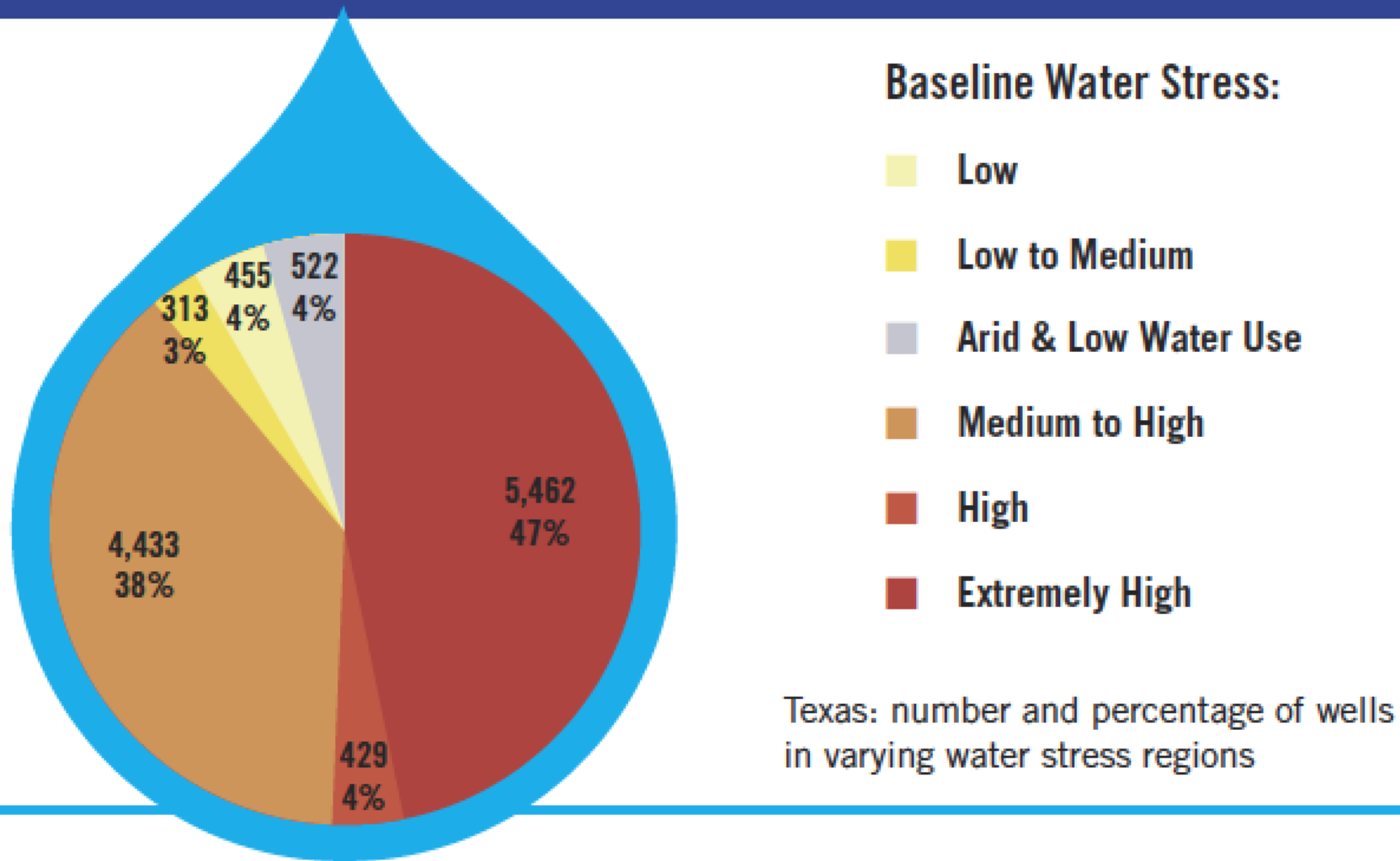
Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

FIGURE 6: VOLUME OF WATER INJECTED FOR HYDRAULIC FRACTURING BY STATE & WATER STRESS REGIONS



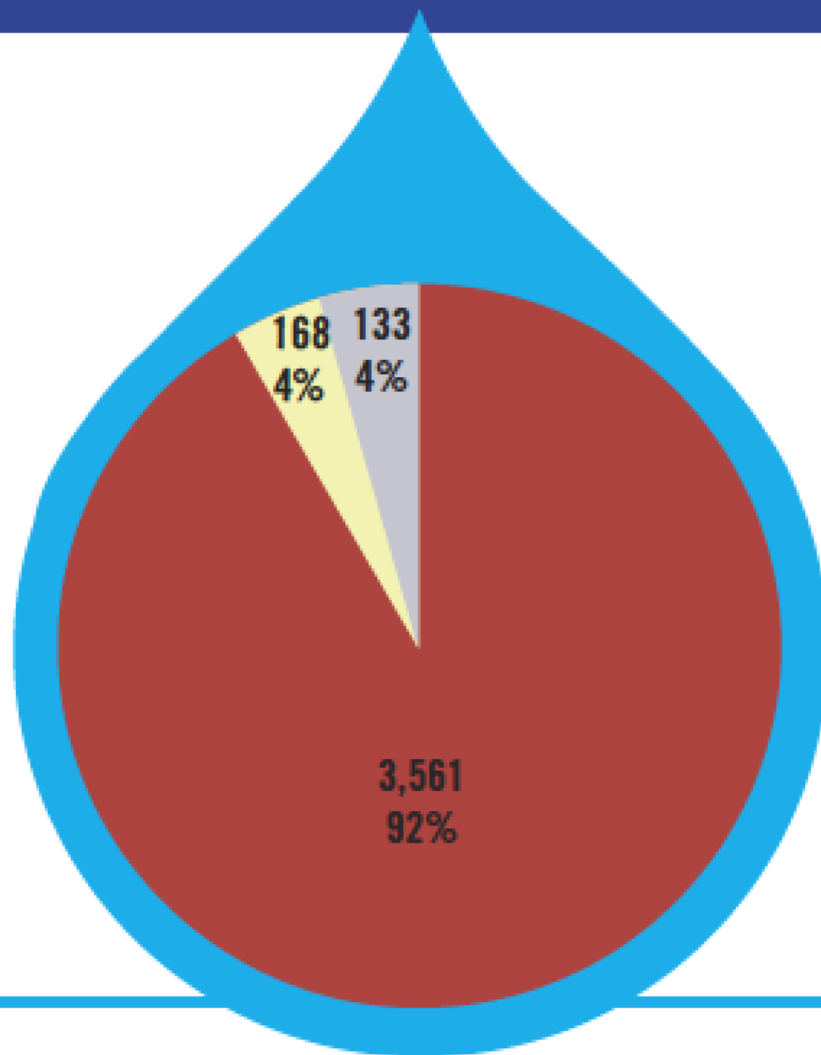
Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

FIGURE 3: TEXAS—NUMBER OF WELLS BY WATER STRESS



Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

FIGURE 4: COLORADO—NUMBER OF WELLS BY WATER STRESS



Baseline Water Stress:

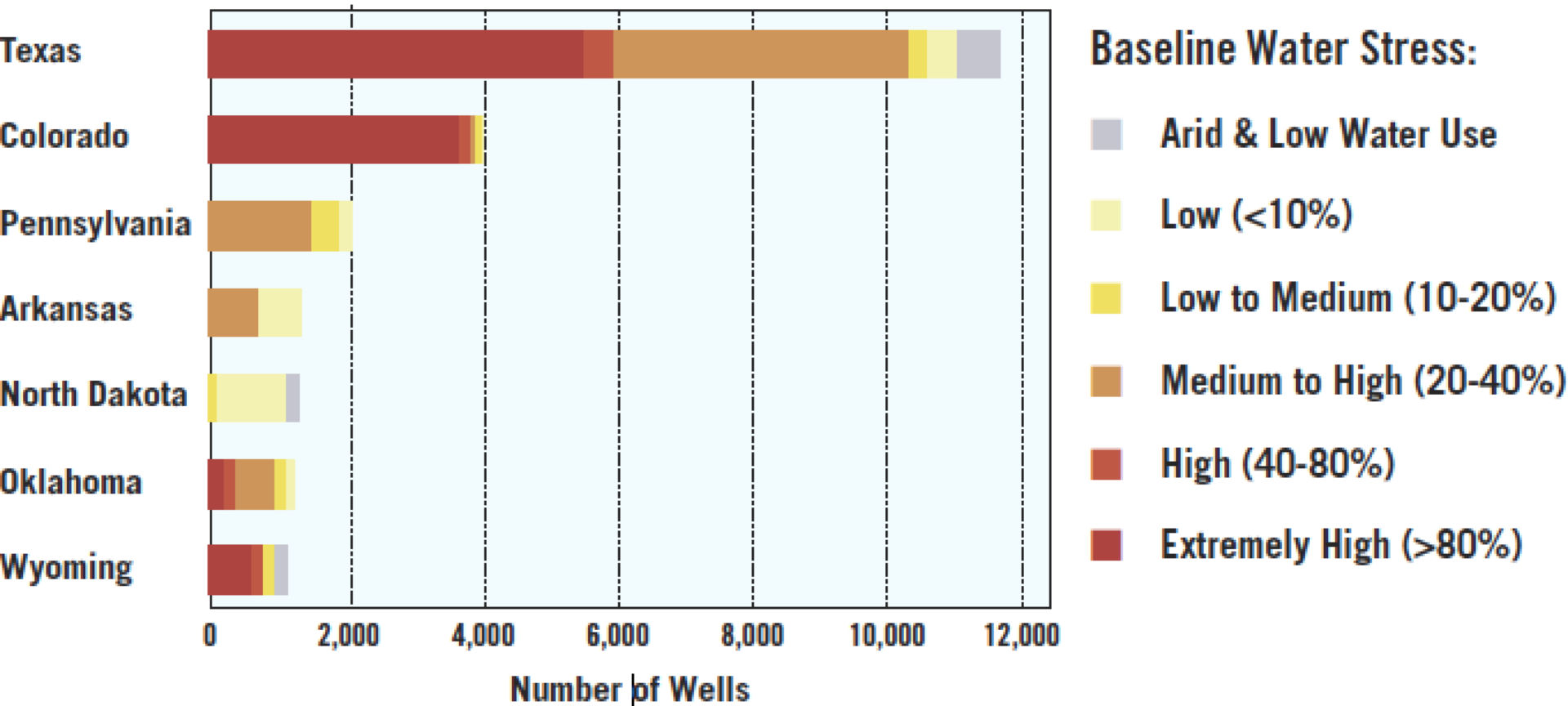
- Low
- Low to Medium
- Arid & Low Water Use
- Medium to High
- High
- Extremely High

Colorado: number and percentage of wells in varying water stress regions

Summary

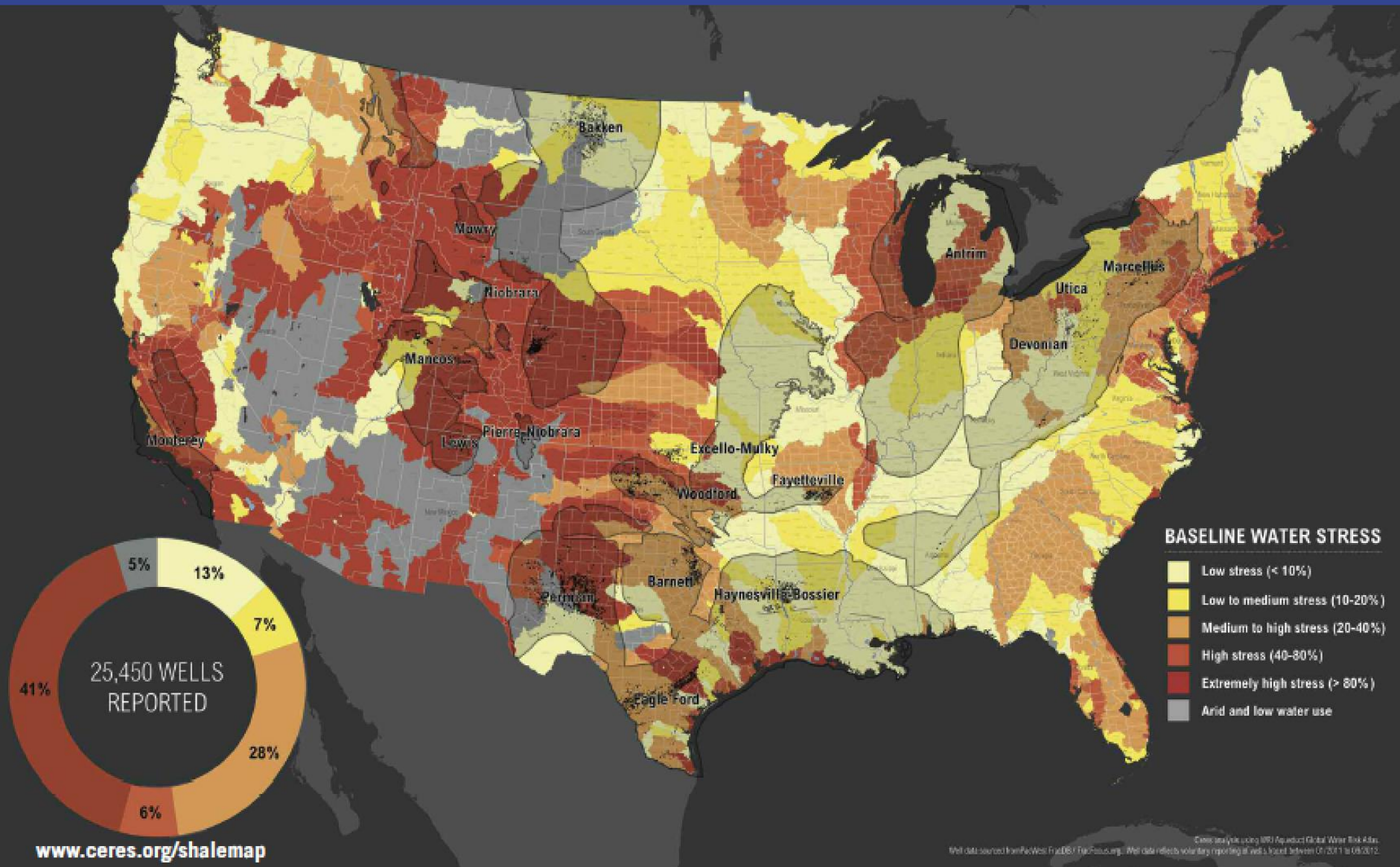
- Drought appears to be with us for many years
 - Continued water scarcity in Southwest and West
- Population continues to grow in water scarce regions
 - Added stress on diminished water supplies
- Agriculture is the first to lose access to water
 - Even if the industry has long standing water rights
 - Puts severe economic pressure on agricultural infrastructure and rural communities
- Energy industry water needs are expanding
 - Water stress regions are using water at increasing rates
 - Majority of water is for energy
 - Where will the trade-off end?

FIGURE 2: NUMBER OF HYDRAULICALLY FRACTURED WELLS BY STATE & WATER STRESS



Source: CERES, Hydraulic Fracturing & Water Stress, May 2013

COMPETITION FOR WATER IN U.S. SHALE ENERGY DEVELOPMENT



Source: CERES, Hydraulic Fracturing & Water Stress, May 2013